circuits are readily damaged if flexed, and must therefore be reinforced with a support layer (present specification at page 1, lines 10-31). Thus, the claimed substrate has superior properties compared to conventional security papers provided with conventional rigid integrated circuits, because the flexible integrated circuit of the claimed substrate is not as readily damaged, and the claimed substrate can be prepared more cheaply (present application at page 2, lines 5-18).

In all of the rejections, the Examiner alleges that the combination of Haghiri and Brown suggest the claimed paper substrate having at least one flexible integrated circuit comprising a semiconductive organic polymer. (As indicated by the Examiner, Giustiani describes security documents, Bratchley describes substrates with optical elements, and Uetani describes semiconductor sheets comprising a polyamide and a polyaniline, but none of these references describe a paper substrate comprising a flexible integrated circuit.)

Haghiri describes a data carrier in the form of a card, for example a card designated by ISO 7810 (Figure 1 and col. 3, lines 51-58). Haghiri never describes the composition of the integrated circuit, and therefore it is reasonable to assume that the integrated circuit of Haghiri is a conventional, rigid, silicon-based semiconductor integrated circuit, rather than the *flexible* integrated circuit of the claimed substrate.

The Office states that "Brown et al teaches a flexible integrated circuit" (Official Action at page 3, line 3). Applicants respectfully disagree with this characterization of Brown. Brown indicates that "silicon chips" may be bonded to flexible plastic substrates (e.g., chip card and identification tags), but such devices are expensive. Less expensive devices comprising a *plastic* insulator layer (e.g., poly(methylmethacrylate) or poly(vinyl chloride)), conducting contacts, and an organic semiconductor may be made by printing onto a *plastic* substrate (page 972, cols. 1 and 2). However, although the *substrate* may be flexible, Brown does not describe a flexible *circuit*.

Applicants respectfully submit that: 1) an integrated circuit attached to a flexible substrate is not *necessarily* flexible; and 2), a circuit having an organic semiconductor layer is not *necessarily* flexible. In regard to 1), Brown indicates, as discussed above, that it is known to attach "silicon chips" to "flexible plastic substrates." Since "silicon chips" are reasonably regarded as rigid, rather than flexible, Brown itself expressly teaches that rigid circuits may be attached to flexible plastic substrates, and therefore *circuits* attached to flexible substrates are not *inherently* flexible. In regard to 2), Applicants note that integrated circuits comprise a variety of different materials. If any of these materials are rigid, the circuit as a whole is rigid, even if individual layers of the circuit are not. For example, Brown describes a MISFET device having an organic semiconductor layer, formed on a "silicon wafer" (page 973, col. 1). Silicon wafers would not reasonably be considered flexible, and therefore Brown expressly describes a rigid circuit having an organic semiconductor layer. Thus, circuits having an organic semiconductor layer are not *inherently* flexible. In other words, even though Brown describes flexible substrates and circuits comprising an organic semiconductor layer, the circuits of Brown are neither expressly nor inherently flexible. Therefore, neither Haghiri nor Brown describe a flexible circuit. Accordingly, the Office has failed to support a *prima facie* case of obviousness (To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 180 USPQ 580 (CCPA 1974)) (M.P.E.P. 2143.03)).

Moreover, Applicants respectfully submit that the only disclosure of flexible integrated circuits comprising a semiconductive polymer layer of record in this case is *Applicants'* claimed substrate (e.g., page 2, lines 5-18 of the present specification). Since neither Brown nor Haghiri (or for that matter, Giustiniani, Bratchley, and Uetani) describe flexible circuits comprising a semiconductive organic polymer, the conclusion of the Office that the MISFET devices of Brown are flexible, improperly relies on *Applicants' own*

disclosure, and is therefore based on impermissible hindsight (MPEP 2142). However, nothing in Brown or Haghiri suggests flexible circuits. As discussed above, Haghiri describes only rigid circuits, and the MISFET devices of Brown are neither expressly nor inherently flexible. In addition, Brown describes attaching circuits to relatively rigid substrates such as "chip cards and identification tags," printing MISFET devices on a plastic substrate, e.g., poly(methylmethacrylate) or poly(vinyl chloride), both relatively rigid plastics, and fails to indicate, in any way, that flexible circuits are desirable (Applicants note that the rationale in Brown for preparing circuits containing organic semiconducting layers is to avoid "expensive photolithographic steps" and "avoiding incompatibility problems", not problems associated with the rigidity of conventional silicon chips). Thus, neither Haghiri nor Brown suggest the flexible circuits of the claimed invention.

Applicants respectfully submit that Brown also teaches away from applying circuits to paper substrates, and in combination with Haghiri, would not be expected to provide a functioning MISFET device on a paper substrate. As discussed above, Brown describes a method of printing MISFET devices on a plastic substrate. Since Brown teaches that a plastic may be used as an insulator layer, and insulator layers are essential components of a MISFET device (page 972, col. 1), Brown effectively teaches that a printed MISFET device would employ the plastic substrate as an insulator layer. One would therefore *not* prepare MISFET circuits on substrates other than plastic, because paper does not have the well-known insulating properties of a plastic. Indeed, if the printed MISFET of Brown was prepared on the paper substrate of Haghiri, one would not expect the MISFET to function properly, since it would lack a proper insulator layer. In other words, one of skill in the art of fabricating MISFET devices would expect that a MISFET device prepared by printing on a paper substrate, as provided by the combination of Haghiri and Brown, would not function, and therefore be unsuitable for its intended purpose (MPEP 2143.01, 2143.02).

In addition, Applicants note that the substrates of Claims 21 and 22 are quite thin – much thinner than the card of Haghiri, defined by ISO 7810 (i.e., has a thickness defined by ISO 7810 of 0.762 mm (762 μm)). As shown in the figures of Haghiri, the electronic module 1 is nearly as thick as the card, and is therefore is reasonably at least a few hundred microns (μm) thick. Thus, the electronic module of Haghiri is reasonably too thick to be incorporated into the substrates of Claims 21 and 22. Brown does not describe the thickness of MISFET devices. However, since the MISFET device exemplified therein is formed on a conventional silicon wafer, it is reasonable to assume that the MISFET devices of Brown have a thickness at least comparable to that of conventional silicon circuits. Thus, the MISFET devices of Brown are also, reasonably, too thick to be incorporated into the substrates of Claims 21 and 22.

Accordingly, and for the reasons stated above, Applicants respectfully request withdrawal of the rejections.

Applicants would like to thank the Examiner for his indication that Claim 16 has been allowed. In addition, Claims 5-7 have been rewritten in independent form as new Claims 27-29. Applicants respectfully submit that the present application is now in condition for allowance, and early notification thereof is earnestly solicited.

Respectfully submitted,

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IN THE CLAIMS

Claims 5-7 (Cancelled).

Claims 27-29 (New).